



*POLYMER
MULTI-LAYER
CAPACITORS*

POLYMER MULTI-LAYER CAPACITORS

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OUTLINE

1. OUTLINE OF PMLCAP®

PMLCAP® is a thin polymer film capacitor which has flat and excellent ESR characteristics within a wide temperature range (up to 125°C) while achieving extreme miniaturization. This is achieved by alternately stacking the thin film polymer and aluminum. Moreover weight is 1/4 of MLCC.

PMLCAP® is suitable for most electronics due to small size and light weight. It is also ideal for audio applications which demand high quality output and pure tone.

2. FEATURES

- ◆ **The polymer layer is employed as the dielectric**
Achieved small size, lightweight, high capacitance compared with conventional film capacitors.
- ◆ **Polymer material is selected to pursue superior performance at high-temperature**
Achieved good frequency and temperature characteristics in high capacitance capacitors.
- ◆ **No characteristic change by piezoelectricity**
Good "bias characteristics", "buzz characteristics" and "harmonic distortion characteristics".

3. APPLICATIONS

- ◆ For I/O of DC/DC converters
- ◆ For around various digital circuits (Decoupling of DSP driving power supply, Low pass filter, By-pass circuit, Coupling between signal lines, etc.)
- ◆ For By-pass circuit to decrease EMC noise
- ◆ For Automotive ECU

CAUTION FOR PROPER USE OF PMLCAP®

Upon using PMLCAP®, please pay attention to the points listed below.
Catalog may be subject to change without notice.

1. RATED VOLTAGE

Sum of D.C. voltage and peak A.C. voltage should not exceed rated voltage(D.C.).

1) When a D.C. rated capacitor is used in an A.C. circuit,
the capacitor generates heat and discharge. Please consult us in this case.

2) Rated voltage derating by category temperature

Please consult us when operating capacitors at high temperature.

3) Rated voltage derating by high frequency

Using capacitors at high frequency will be shorten its life due to the generation of heat. Please consult us in this case.

4) Use in special wave-form

If you want to use capacitors with a special wave-form other than a sine wave, please inquire to us for details after identifying the wave-form with which the capacitor is required to be used, because the effective value varies with wave-form.

2. PERMISSIBLE CURRENT

1) Permissible current for frequency

Please contact us in advance.

2) Permissible peak current (pulse current)

If you want to use the capacitor with a special wave-form other than a sine wave, please inquire to us for details after identifying the wave-form with which the capacitor is required to be used, because the effective value varies with wave-form.

3. SELF HEAT RISE

Please confirm self heat rise (within 10°C) when the capacitors shall be maintained.

4. CATEGORY TEMPERATURE

Atmospheric temperature range at which a capacitor may be used continuously. However, when the temperature of capacitor goes up due to A.C. components included in A.C. voltage or D.C. voltage (ripple), the maximum temperature at the surface of the capacitor shall be considered as the upper category temperature.

5. USE IN HUMID ENVIRONMENT

When used for a long time humid environment, the capacitor elements absorb moisture. As a result, the capacitor might break down. When used under the humid condition, please consult us.

6. SOLDERING**1) Reflow soldering**

This capacitor shall be used in only reflow method. Don't use in flow, dipping and VPS soldering method. Please confirm your reflow conditions (reflow time, temperature). Soldering conditions should be according as recommended reflow temperature profile.

2) Using soldering iron

Use the soldering iron for the case of testing, reworking under the following conditions.

Items	Conditions
Temperature	350°C Max
Time	4.0 seconds Max
Power	30W Max
Other	No preheat

- Soldering frequency shall be 1 time.
- Reworking with soldering iron after reflow soldering shall be performed with above conditions. Reworking frequency shall be 1 time.
- The tip of soldering iron must not touch with capacitors directly.
- Please contact us in advance when require further conditions except for above.

3) Solder paste

A recommended solder paste thickness is between 0.1mm to 0.2mm. The content of halogen in the soldering flux should be 0.1wt% or less.

4) Tentative mounting

This Product cannot be used again when the double-stick tape is used for tentative mounting.

7. CLEANING SOLVENTS

Please contact us in advance when cleaning the PC board after mounting. If used improper cleaning agent and/or ultrasonic, the capacitor may be damaged.

8. STORAGE CONDITION

In environment with humidity change, capacitance of this capacitor will change (increase and decrease) because of capacitor absorb or discharge moisture by environment. The aluminum moisture-proof bag (dry pack) with silica-gel is used for shipping. But, the reliability after soldering may be deteriorated depending on the storage conditions after opening dry pack due to the absorbing of capacitor.

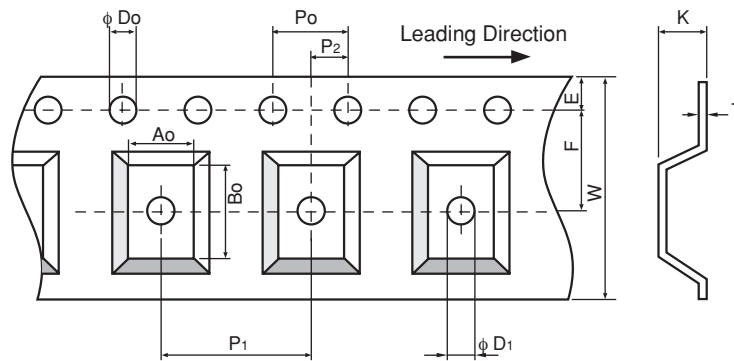
The capacitor after opening dry pack should be kept in dry storage conditions at a relative humidity less than 50% or be kept in dry pack with silica-gel again.

When the capacitor, that absorbs moisture, is mounted in a reflow method, dry the capacitor to 125°C for over 5 hours, then mount.

9. DISPOSAL

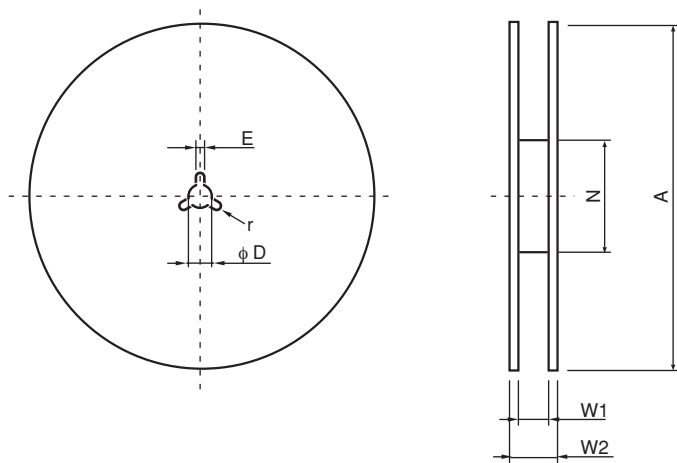
In case of rejecting capacitors, please seek for professionals who deal with the industrial wastes management.

◆ **CARRIER TAPE DIMENSIONS**



Chip size	Taping code	Dimensions [mm]											
		A_0 ± 0.1	B_0 ± 0.1	W ± 0.3	F ± 0.05	E ± 0.1	P_1 ± 0.1	P_2 ± 0.04	P_0 ± 0.1	ϕD_0 ± 0.1	ϕD_1 $+0.2/-0$	K ± 0.1	T ± 0.05
3216	A 1	2.00	3.60	8.0	3.5	1.75	4.0	2.0	4.0	1.5	1.0	1.4	0.20
	A 2											1.8	0.25
3225	B 1	2.90	3.60	8.0	3.5	1.75	4.0	2.0	4.0	1.5	1.0	1.8	0.25
	B 2											2.2	0.25
	B 3											2.4	0.25
4532	C 1	3.60	4.90	12.0	5.5	1.75	8.0	2.0	4.0	1.5	1.5	1.8	0.25
	C 2											2.2	0.25
	C 3											2.4	0.25
	C 4											3.0	0.25
5750	D 1	5.40	6.10	12.0	5.5	1.75	8.0	2.0	4.0	1.5	1.5	2.2	0.25
	D 2											2.6	0.25
	D 3											3.0	0.25

◆ **REEL DIMENSIONS**



Chip size	Reel size	Quantity
3216	$\phi 180\text{mm}$	2000pcs/reel
3225	$\phi 180\text{mm}$	2000pcs/reel
4532	$\phi 254\text{mm}$	1500pcs/reel
5750	$\phi 254\text{mm}$	1500pcs/reel

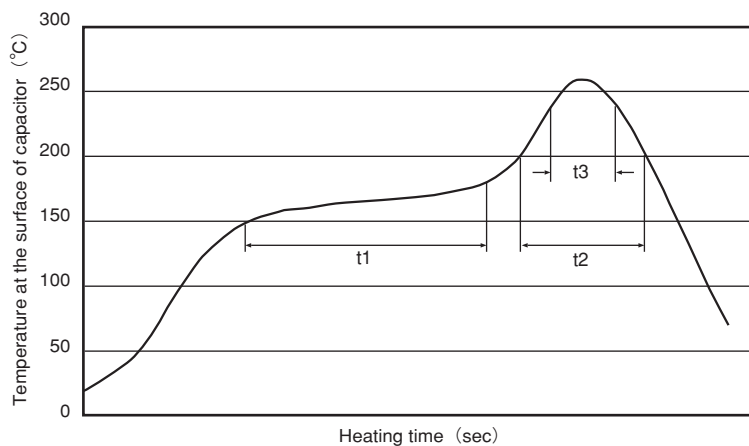
(mm)

Taping code	A	N	W 1	W 2	D	E	r
A, B	$\phi 180 \pm 1.0$	$\phi 60 \pm 1.0$	9.5 ± 1.0	13.1 ± 1.0	$\phi 13.0 \pm 0.2$	2.0 ± 0.5	1.0 ± 0.2
C, D	$\phi 254 \pm 1.0$	$\phi 100 \pm 1.0$	13.5 ± 1.0	18.5 ± 1.0	$\phi 13.0 \pm 0.2$	2.0 ± 0.5	1.0 ± 0.2

● SOLDERING CONDITIONS

◆ REFLOW SOLDERING CONDITIONS

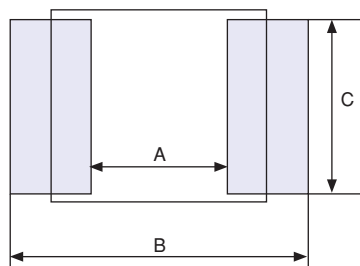
- 1) Surface temperature of capacitor shall not exceed the value shown in the following table.
- 2) Period that temperature at surface of capacitor becomes more than 200°C and peak temperature shall not exceed t2 and t3 seconds shown in the following table, respectively.
- 3) Holding time at the peak temperature shall be as short as possible.
- 4) Preheat temperature shall be made between 150 to 180°C and made maximum t1 seconds shown in the following table.
- 5) Soldering frequency shall be less than 2 times. The second soldering should be carried after the capacitor itself has returned to normal temperature.



	(T)	(t1)	(t2)	(t3)
150~180°C	260°C	180sec	90sec	40sec

◆ RECOMMENDED LAND SIZE

For designing land size, refer to the following recommended land size.

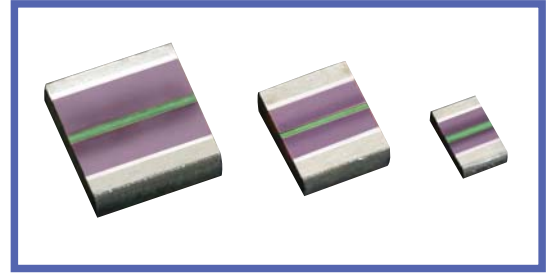


Chip size	Dimensions (mm)		
	A	B	C
3216	1.8	3.6	1.4
3225	1.8	3.6	2.3
4532	2.7	5.7	3.0
5750	3.5	7.8	4.5

ST SERIES

◆ FEATURES

- Surface-mounted device.
- Lead free reflow soldering is available.
- RoHS compliance.



◆ SPECIFICATIONS

Items	Characteristics
Category Temperature Range	-55~+125°C
Rated Voltage Range	16~63V.DC
Rated Capacitance Range	0.22~22μF(224~226) E6 series
Capacitance Tolerance	± 20% (M)
Dissipation Factor(tanδ)	1.5% or less(1kHz± 20%, 5Vrms or less)
Voltage Proof	Nothing abnormal shall be found, when applying 150% of the rated voltage for 1minute or of 175% of the rated voltage for 1 second to 5 seconds.
Insulation Resistance	300MΩ • μF or more (After 1 minute application of rated voltage)

◆ PART NUMBER

Rated Voltage

Code	Rated Voltage
16	16V.DC
25	25V.DC
35	35V.DC
50	50V.DC
63	63V.DC

Series

Code	Capacitance
224	0.22μF
684	0.68μF
335	3.3μF
106	10μF
226	22μF

Rated Capacitance

Capacitance Tolerance

Code	Tolerance
M	± 20%

Symbol denoting dimension of carrier tape.
Refer to table of carrier tape.

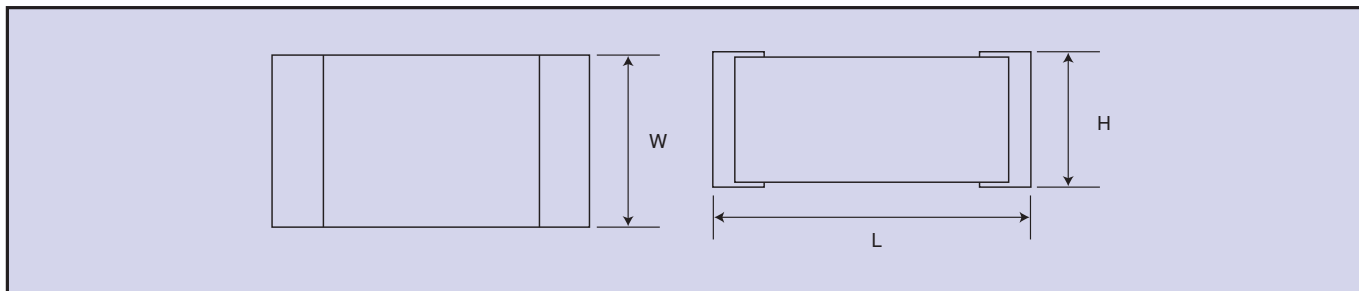
Option

TP code

Chip Size

Code	Chip Size
3216	3.2x1.6mm
3225	3.2x2.5mm
4532	4.5x3.2mm
5750	5.7x5.0mm

◆ DIMENSIONS



◆ STANDARD SIZE (L ± 0.3xW ± 0.3xH ± 0.2)

Rated Voltage (V.DC)	Rated capacitance (μF)	Size			Part No.
		L (mm)	W (mm)	H (mm)	
16	1.0	3.2	1.6	1.4	16ST105MA23216
	1.5	3.2	1.6	1.4	16ST155MA23216
	2.2	3.2	2.5	1.8	16ST225MB23225
	3.3	3.2	2.5	2.0	16ST335MB33225
	4.7	4.5	3.2	1.4	16ST475MC14532
	6.8	4.5	3.2	1.8	16ST685MC24532
	10	4.5	3.2	2.6	16ST106MC44532
	15	5.7	5.0	1.8	16ST156MD15750
	22	5.7	5.0	2.6	16ST226MD35750
25	0.68	3.2	1.6	1.4	25ST684MA23216
	1.0	3.2	1.6	1.4	25ST105MA23216
	1.5	3.2	2.5	2.0	25ST155MB33225
	2.2	3.2	2.5	1.8	25ST225MB23225
	3.3	4.5	3.2	1.4	25ST335MC14532
	4.7	4.5	3.2	1.8	25ST475MC24532
	6.8	4.5	3.2	2.6	25ST685MC44532
	10	5.7	5.0	1.8	25ST106MD15750
	15	5.7	5.0	2.6	25ST156MD35750
35	0.47	3.2	1.6	1.0	35ST474MA13216
	0.68	3.2	1.6	1.4	35ST684MA23216
	1.0	3.2	2.5	1.4	35ST105MB13225
	1.5	3.2	2.5	2.0	35ST155MB33225
	2.2	4.5	3.2	1.4	35ST225MC14532
	3.3	4.5	3.2	1.8	35ST335MC24532
	4.7	4.5	3.2	2.6	35ST475MC44532
	6.8	5.7	5.0	1.8	35ST685MD15750
	10	5.7	5.0	2.6	35ST106MD35750

Rated Voltage (V.DC)	Rated capacitance (μF)	Size			Part No.
		L (mm)	W (mm)	H (mm)	
50	0.22	3.2	1.6	1.0	50ST224MA13216
	0.33	3.2	1.6	1.4	50ST334MA23216
	0.47	3.2	2.5	1.4	50ST474MB13225
	0.68	3.2	2.5	2.0	50ST684MB33225
	1.0	4.5	3.2	1.4	50ST105MC14532
	1.5	4.5	3.2	1.8	50ST155MC24532
	2.2	4.5	3.2	2.6	50ST225MC44532
	3.3	5.7	5.0	1.8	50ST335MD15750
	4.7	5.7	5.0	2.6	50ST475MD35750
63	0.22	3.2	1.6	1.4	63ST224MA23216
	0.33	3.2	2.5	1.4	63ST334MB13225
	0.47	3.2	2.5	1.8	63ST474MB23225
	0.68	4.5	3.2	1.4	63ST684MC14532
	1.0	4.5	3.2	1.8	63ST105MC24532
	1.5	4.5	3.2	2.6	63ST155MC44532
	2.2	5.7	5.0	1.8	63ST225MD15750
	3.3	5.7	5.0	2.6	63ST335MD35750

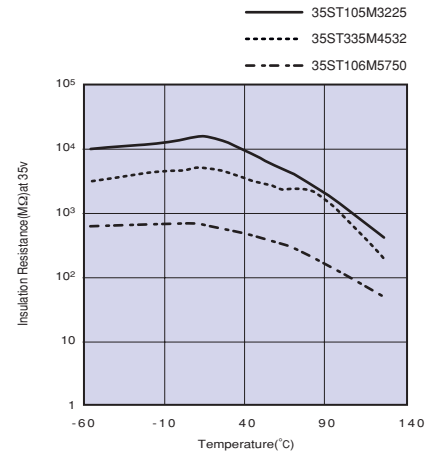
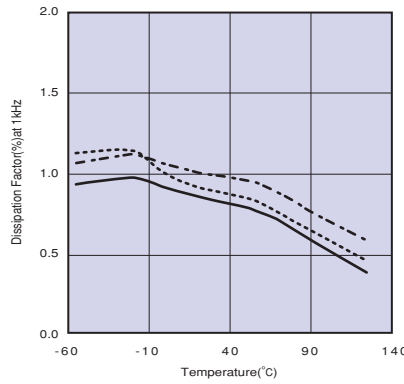
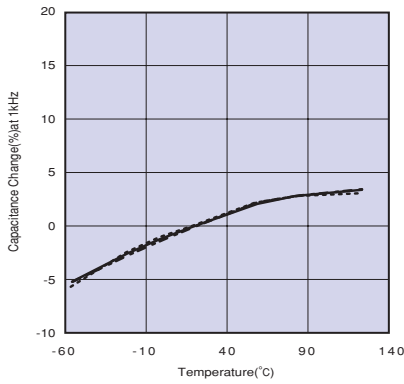
Size Code Conversion

mm	inch
3216	1206
3225	1210
4532	1812
5750	2220

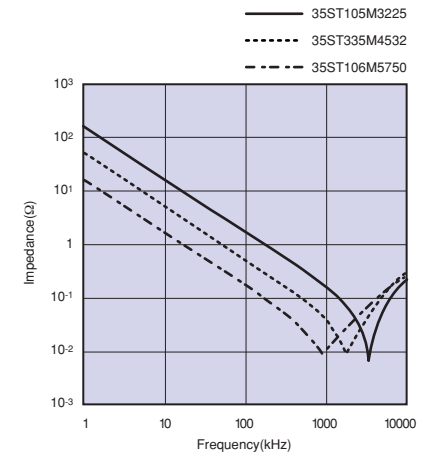
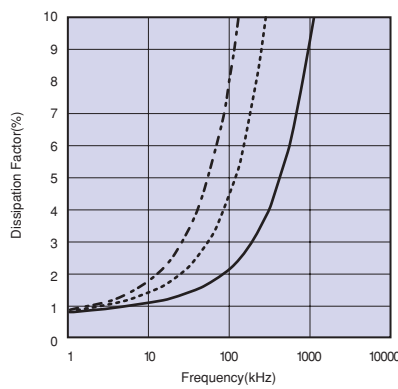
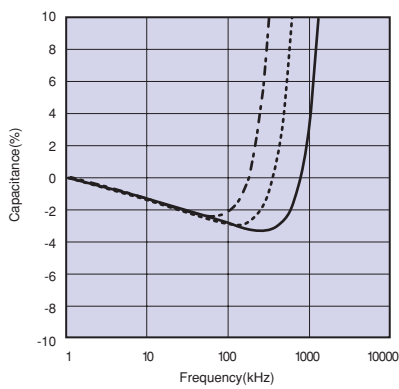
*A custom size of the product is available. Please consult us for detail.

◆ CHARACTERISTICS

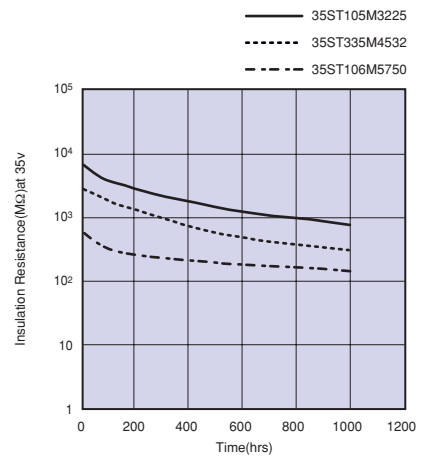
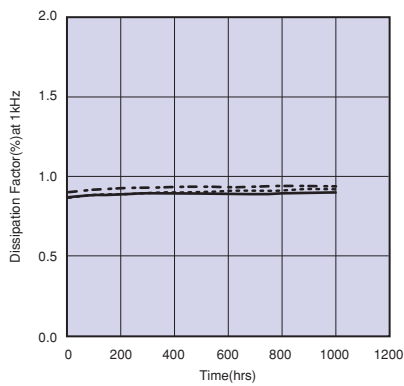
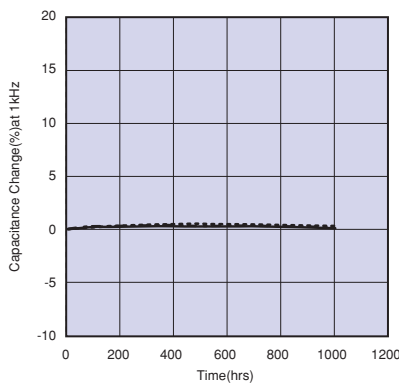
◆ TEMPERATURE CHARACTERISTICS



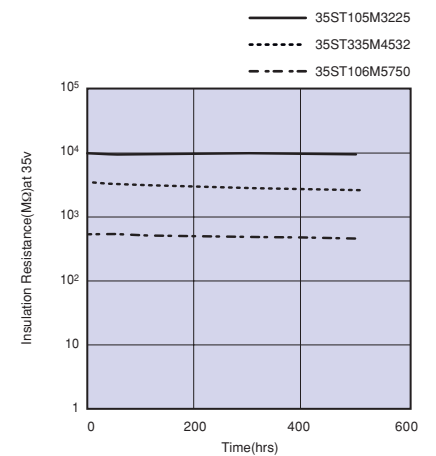
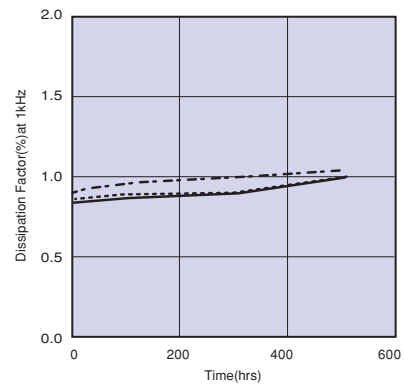
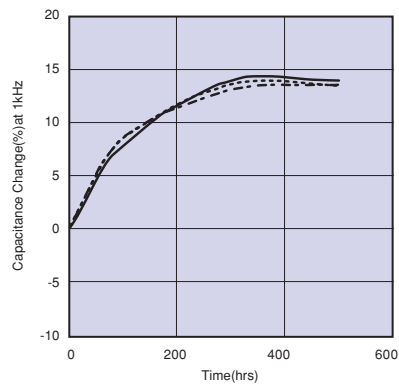
◆ FREQUENCY CHARACTERISTICS



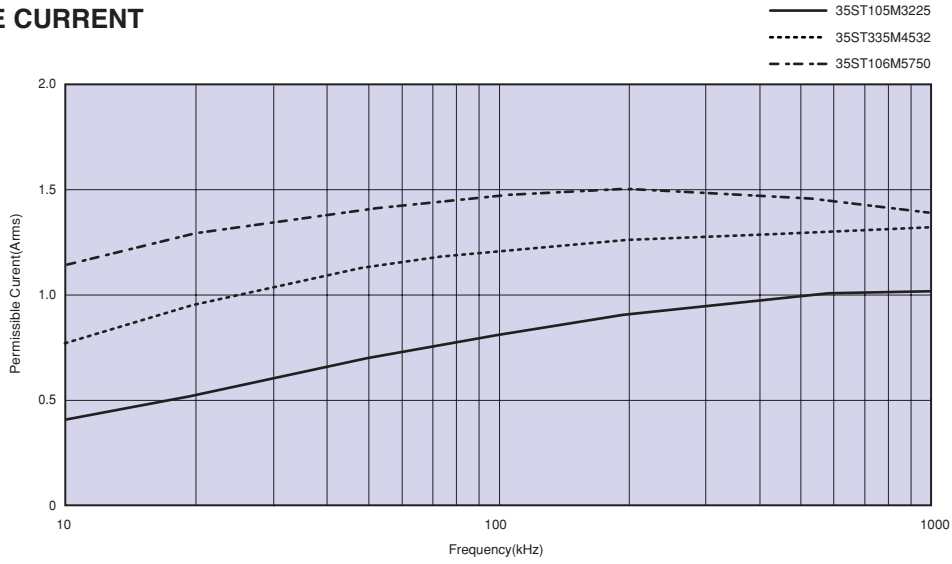
◆ HIGH TEMPERATURE LOADING (125°C, 125% of rated voltage)



◆ MOISTURE RESISTANCE LOADING (40°C 95%RH, Rated voltage)



◆ PERMISSIBLE CURRENT



◆ BUZZ · HARMONIC DISTORTION

